REMARKS

Claims 1-9 are pending in this application, of which claims 1 and 4-9 have been amended. No new claims have been added.

A substitute specification is attached hereto, correcting various grammatical, spelling and idiomatic errors, along with a marked-up copy of the original. No new matter has been added.

The Examiner has objected to the drawings for failing to show "axial multiple angle NX" recited in claims 4-5.

Figs. 2 and 3 show an example of an axial multiple angle NX, where N=2. This will be explained in more detail in the discussion of the 35 USC §112, second paragraph, rejection discussed below.

The Examiner has objected to the disclosure for failing to provide descriptions for Figs. 6-8.

Applicants respectfully disagree. Page 11, lines 1-11 of the specification describe Fig. 9; page 11, lines 11-19 describe Fig. 7; and page 11, lines 19-22 describe Fig. 8.

Claims 4 and 5 stand rejected under 35 USC §112, second paragraph, as indefinite.

Applicants note that page 12, lines 16-18 of the specification describe "2X" as representing "a resolver having a pole logarithm of 2, wherein 'X' is usually added when it is expressed in terms of axial multiple angle."

As noted above, an example of a 2X resolver is shown in Fig. 2 and in Fig. 3.

For example, the resolver detecting phase patterns 56 and 57 prepared in he stator side sheet coil 5 each have four eddy patterns, respectively.

Among these, in order to count two eddy patterns as a resolver detecting phase patterns of one pole, the composition having four eddy patterns can be expressed as a composition of the resolver detecting phase pattern having a pole logarithm of 2.

Moreover, in the case of the resolver exciting phase pattern 65 prepared in the rotator side sheet coil 6, it is the same as the resolver detecting phase patterns 56 and 57 prepared in the stator side sheet coil 5.

Accordingly, claims 4-5 has been amended to clarify this description.

Thus, the 35 USC §112, second paragraph, rejection should be withdrawn.

Claim 1 stands rejected under 35 USC §103(a) as unpatentable over U.S. Patent 5,229,696 to Golker et al. (hereinafter "**Golker et al.**") in view of JP 8136211 to Ryuichiro (hereinafter "**Ryuichiro**").

Applicants respectfully traverse this rejection.

Golker et al. discloses a semiconductor in which the stator and the rotor each have disk-shaped iron parts between which a disk-ring-shaped axial air gap is formed. The stator and rotor windings are fashioned as spiral-shaped conductor paths/interconnects on insulating layers which are glued onto the end surfaces of the iron parts of the stator and the rotor resulting in a very short axial length servomechanism.

Ryuichiro has been cited for teaching the secondary and primary transformers formed of sheet coils (Figures 3 and 4) for the purpose of reducing cost.

The Examiner has urged that the claimed resolver patterns correspond to windings 11 and 13 in **Golker et al**. If so, **Golker et al.** fails to teach, mention or suggest that the stator side sheet

coil is formed of a single sheet composed of a disk having said resolver detecting phase pattern formed, a disk having said rotary transformer primary side pattern formed, and a linear portion that links the corresponding two disks with each other, as recited in claim 3 of the instant application.

Accordingly, claim 3 has been cancelled and claim 1 has been amended to recite this distinction.

Thus, the 35 USC §103(a) rejection should be withdrawn.

Claims 2-9 stands rejected under 35 USC §103(a) as unpatentable over **Golker et al.** and **Ryuichiro et al.** and further in view of U.S. Patent 5,644,183 to Van Loenen et al. (hereinafter "**Van Loenen et al.**")

Applicants respectfully traverse this rejection.

Van Loenen et al. discloses a flat electric motor having a stator formed from a folded stack of flat electrically insulating support elements with printed conductor windings.

Van Loenen et al. is directed to an electric motor in which the flat windings perform a much different function than the "rotary transformer" and "resolver phase patterns" of the resolver of the present invention. **Van Loenen et al.** also fails to teach, mention or suggest the eddy pattern limitations recited in at least claims 4-5, 7 and 9 of the instant application.

Thus, 35 USC §103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-9, as amended, are in condition for allowance, which action, at an early date, is requested.

U.S. Patent Application Serial No. 09/868,929

Attached hereto is a marked-up version of the changes made to the specification, Abstract and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with markings to show changes made
Substitute Abstract of the Disclosure
Marked-Up Specification
Substitute Specification

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VERSION WITH MARKINGS TO SHOW CHANGES MADE 09/868,929

IN THE ABSTRACT:

Amend the Abstract as follows:

A disklike rotor [(4)] is placed with air gaps between disklike stators [(2, 3)]. The disklike rotor [(4)] has a sheet coil [(6)] attached to its sides, on which are formed the secondary coil pattern of a rotary transformer and a resolver excitation phase pattern. A sheet coil [(5)] having the secondary coil pattern of the rotary transformer is attached to the stator [(2)] opposed to the secondary coil pattern on the rotor, while a sheet coil [(5)] having a resolver detection phase pattern is attached to the stator [(3)] opposed to the resolver excitation phase pattern on the rotor. This resolver using a sheet coil is inexpensive and small-sized, decreases angular errors, and avoids the decrease in detection voltage. The variation in amplitude of flux linkage can be limited if there is misalignment of a sheet coil.

IN THE CLAIMS:

Amend claims 1 and 4-9 as follows:

1. (Amended) A resolver including a disk-shaped rotor and two disk-shaped stators between which said rotor is placed with air gaps in the axial direction thereof, wherein said rotor is such that a rotor side sheet coil is attached to both sides of a disk-shaped soft magnetic material on which are formed a secondary side pattern of a rotary transformer and a resolver excitation phase pattern, and

a stator side sheet coil having a rotary transformer primary side pattern formed on a disk-shaped soft magnetic material is attached to one of said stators opposed to said rotary transformer secondary pattern, and a stator side sheet coil having a resolver detection phase pattern formed on a disk-shaped soft magnetic material is attached to the other of said stators opposed to said resolver excitation phase pattern,

wherein said stator side sheet coil is formed of a single sheet composed of a disk having said resolver detection phase pattern formed, a disk having said rotary transformer primary side pattern formed, and a linear portion that links the corresponding two disks with each other.

4. (Amended) The resolver using a sheet coil as set forth in Claim 1 or 2, wherein said rotary transformer secondary side pattern formed on both sides of the disk [according to the invention] is a pattern eddy from outside to inside, and both the patterns are connected to each other in series, and said resolver excitation phase pattern that is formed at both sides of the disk is a pattern eddying by 2N times in the circumferential direction, where N is a natural number, and the center of the eddy pattern on the surface side is disposed at the same position of the eddy pattern on the rear side in the circumferential direction, and 4N [eddies] eddy patterns are connected to each other in series, wherein the axial multiple angle is NX, where NX means the resolver has a pole logarithm of N.

5. (Amended) The resolver using a sheet coil as set forth in Claim 1 [or 3], wherein said rotary transformer primary side pattern is formed on both sides of the disk, and both patterns eddying

from outside to inside are connected to each other in series, and said resolver detection phase pattern is formed on both sides of the disk, and one side of which is an "α" and the other of which is a "β" phase, wherein 2N patterns eddying in the circumferential direction are disposed, wherein N is a natural number, and the center positions of the [eddies] eddy portions of the "α" phase and the "β" phase slip by 90/N° from each other in the circumferential direction, and

2N [eddies] eddy patterns are connected to each other in series to cause the axial multiple angle to become NX, where NX means the resolver has a pole logarithm of N.

6. (Twice Amended) The resolver using a sheet coil as set forth in [any one of Claims] Claim 1 [through 3] or Claim 2, wherein one of either the outer diameter of said rotary transformer secondary side pattern or that of said rotary transformer primary side pattern is made larger than the other thereof.

7. (Twice Amended) The resolver using a sheet coil as set forth in [any one of Claims] Claim 1 [through 3] or Claim 2, wherein the radius r_2 of the extremely outer conductor of said rotary transformer secondary side pattern and radius r_1 of the extremely outer conductor of said rotary transformer primary side pattern is established so as $0 < r_2 - r_1 \leq 4 \times \lambda_2$ or $0 < r_1 - r_2 \leq 4 \times \lambda_1$ where the pattern pitch of the rotary transformer secondary side pattern is λ_2 and the pattern pitch of the rotary transformer primary side pattern is λ_1.

8. (Twice Amended) The resolver using a sheet coil as set forth in [any one of Claims] Claim 1 [through 3] or Claim 2, wherein the outer diameter of said resolver excitation phase pattern is made larger than the outer diameter of the resolver detection phase pattern while the inner diameter of the resolver excitation phase pattern is made smaller than the inner diameter of the resolver detection phase pattern, or the outer diameter of the above-described detection phase pattern is made larger than the outer diameter of the above-described excitation phase pattern while the inner diameter of the detection phase pattern is made smaller than the inner diameter of the excitation phase pattern.

9. (Twice Amended) The resolver using a sheet coil as set forth in [any one of Claims] Claim 1[, 2 and 3] or Claim 2, wherein, where the pattern pitch of the resolver detection phase pattern is λ_θ, and the pattern pitch of the solver detection phase pattern is λ_α, the radious $r_{\theta o}$ of the extremely outer conductor of the resolver excitation phase pattern and the radious $r_{\alpha o}$ of the extremely outer conductor of the rotary transformer primary side pattern, or the radius $r_{\theta I}$ of the extremely inner conductor of the resolver excitation phase pattern and the radius $r_{\alpha I}$ of the extremely inner conductor of the rotary transformer primary side pattern are established so as to become

$0 < r_{\alpha o} - r_{\theta o} \leq 4 \times \lambda_\alpha$

and

$0 < r_{\theta i} - r_{\alpha i} \leq 4 \times \lambda_\alpha$

or

$0 < r_{\theta o} - r_{\alpha o} \leq 4 \times \lambda_\theta$

and

$0 < r_{\alpha i} - r_{\theta i} \leq 4 \times \lambda_{\theta}$.